2.3 Non-Operating System Test the External Resources

In non-operating system, the main PWM control test buzzer, RTC Real Time Clock test, AD conversion tests button, touchscreen, a variety of LCD, infrared testing, I2C bus test, audio input and output, SD card function.

2.3.1 Download Test Procedure to Run

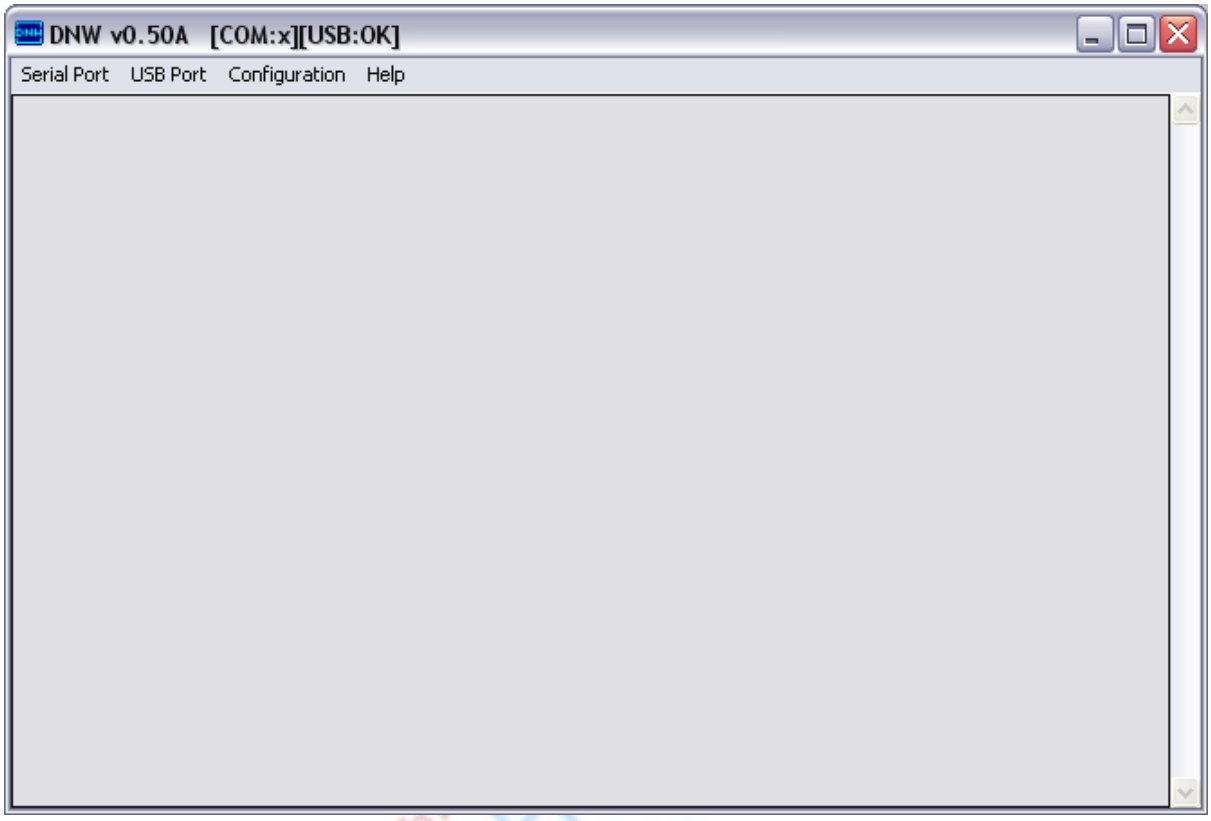
Description: 2440test is a bare-metal test procedure; it is not an operating system, the program were modified from documents from the same Samsung manufacturer, we have according to the actual situation, change the output of the test menu and make it more concise, in order to test and friendly use, we have compiled a LCD display for different types of executable binary output text items (see table below), use the steps in this section through the USB memory can be downloaded to run, the difference lies in the default display LCD display type output; in fact they are all using the same code of the compiler, simply change the header files LCD type look (2440test\inc\Option.h in "LCD_TYPE" definition) can be.

File Name	Description	Remarks
2440test_N35.bin	The default display output support NEC3.5-inch LCD screen	Because they are the same code, following this we have several different the test showed that the output files are collectively referred to 2440test.bin
2440test_A70.bin	The default display output support Innolux 7-inch LCD screen	
2440test_VGA1024x768.bin	The default display output support for VGA (resolution:1024x768 @ 70Hz)	

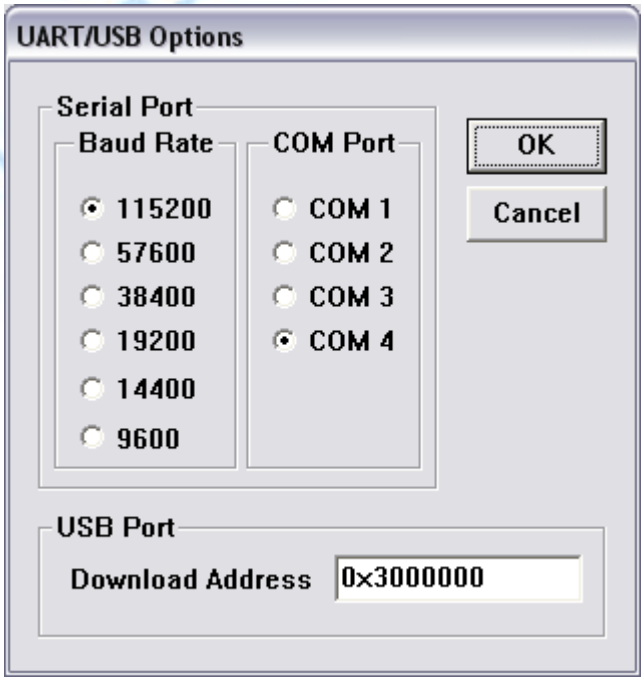
On CD-ROM "images\" directory to find 2440test.bin files downloaded through the BIOS to run the test procedure, steps are as follows:

(1) Connect good development board power supply, serial cable, USB cable, and set the S2 DIP-switch to start system in NOR flash HyperTerminal to open serial port, respectively, and DNW, the power development board to start.

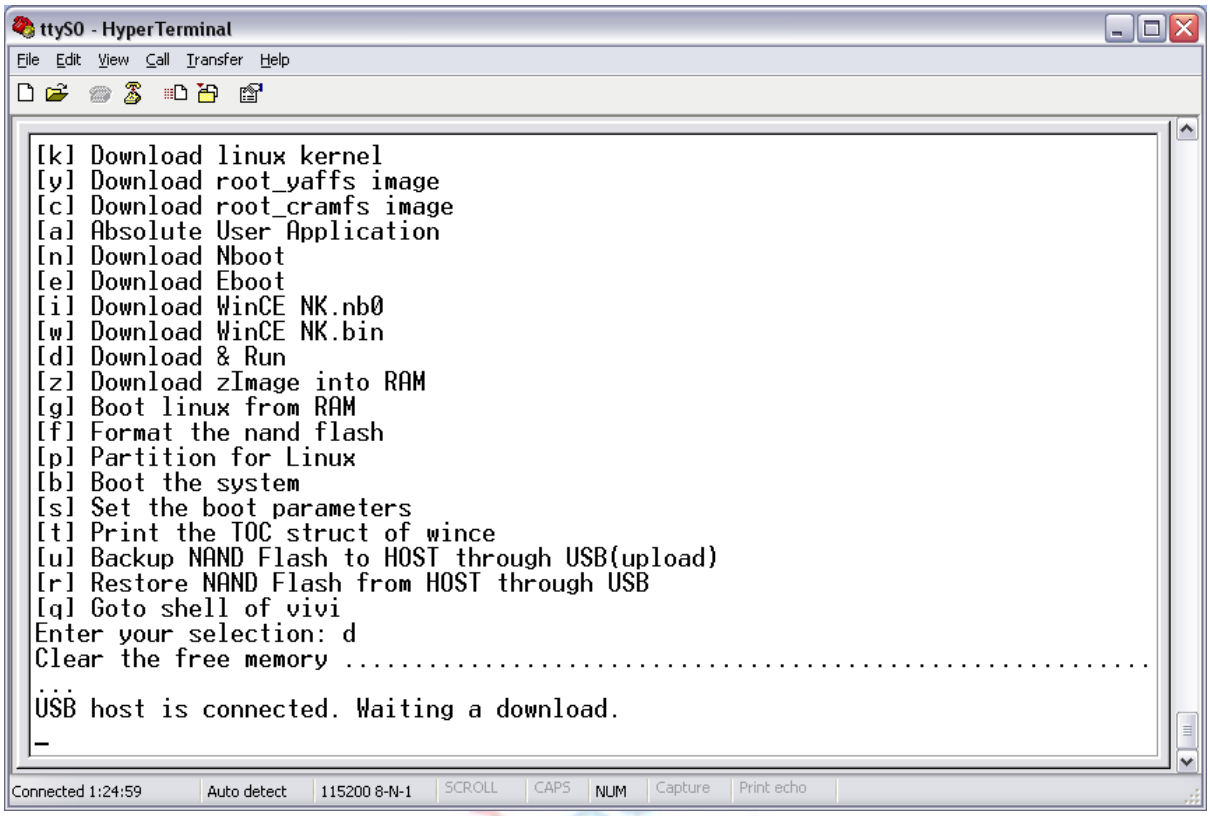
(2) Ensure the USB driver has been installed (as has already been described in detail the installation of USB driver), this can be see DNW's title bar show [USB: OK], if there is no driver installed will be displayed [USB: x], as shown.



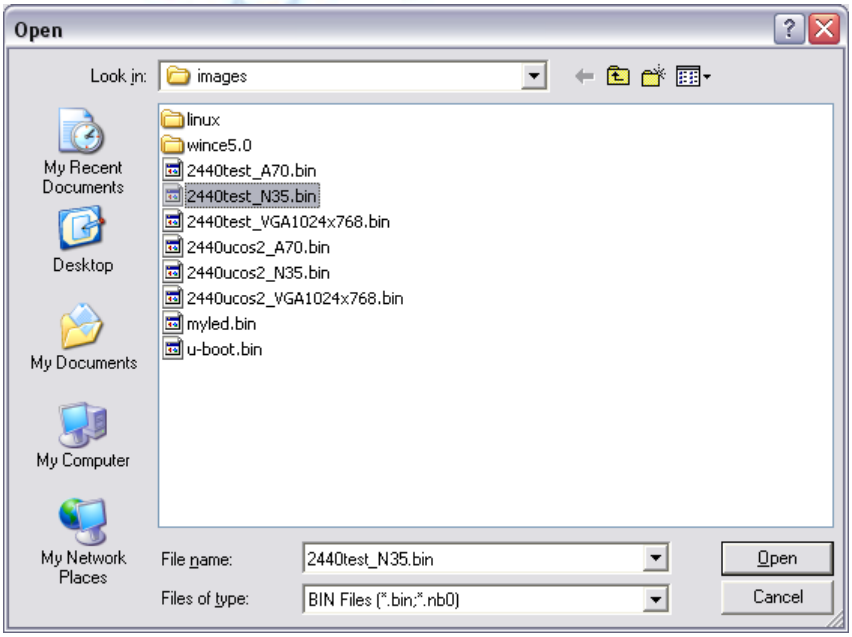
(3) In DNW Menu Configuration, set the USB to download to run address 0x30000000.



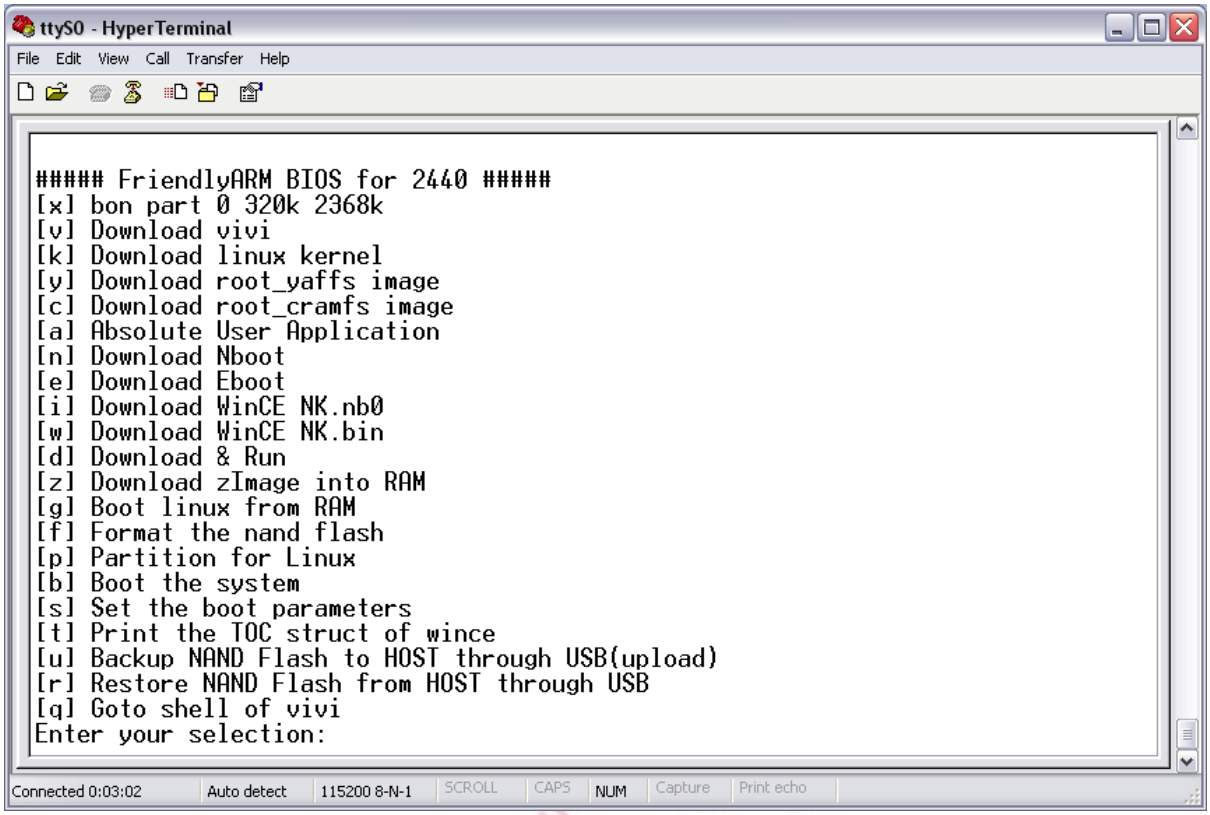
(4) In the BIOS functions of the HyperTerminal menu, select [d], there to wait for USB download message.


ttyS0 - HyperTerminal
File Edit View Call Transfer Help
[k] Download linux kernel
[y] Download root_yaffs image
[c] Download root_cramfs image
[a] Absolute User Application
[n] Download Nboot
[e] Download Eboot
[i] Download WinCE NK.nb0
[w] Download WinCE NK.bin
[d] Download & Run
[z] Download zImage into RAM
[g] Boot linux from RAM
[f] Format the nand flash
[p] Partition for Linux
[b] Boot the system
[s] Set the boot parameters
[t] Print the TOC struct of wince
[u] Backup NAND Flash to HOST through USB(upload)
[r] Restore NAND Flash from HOST through USB
[q] Goto shell of vivi
Enter your selection: d
Clear the free memory .....
...
USB host is connected. Waiting a download.
Connected 1:24:59 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo

(5) Click on the DNW "USB Port > Transmit / Restore", select the image file 2440test.bin (in CD-ROM directory of images below), and then click "open" to start the download.



(6) After the downloaded, it will automatically run the following interface appears:



At the same time, the following appears on the LCD interface.

Description: 2440test compile time, through the "2440test\inc\Option.h" document "LCD_TYPE" the definition of LCD screen can choose to initialize the model, cannot choose more than two models, in this default LCD_TYPE_N35, NEC3.5-inch color screen.

Definition in 2440test\inc\Option.h for LCD Model:

define LCD_TYPE_N35 1; NEC3.5-inch true color definition models

define LCD_TYPE_A70 2; 7-inch true color definition models

define LCD_TYPE_VGA1024x768 3; VGA module, resolution: 1024x768 @ 70Hz

define LCD_TYPE LCD_TYPE_N35

The use of NEC3.5-inch screen (2440test.bin default), the interface will appear as follows.

The use of 7-inch true color screen, the interface will appear as follows.

If you are using VGA Module (1024x768 @ 70Hz), the interface will appear as follows:

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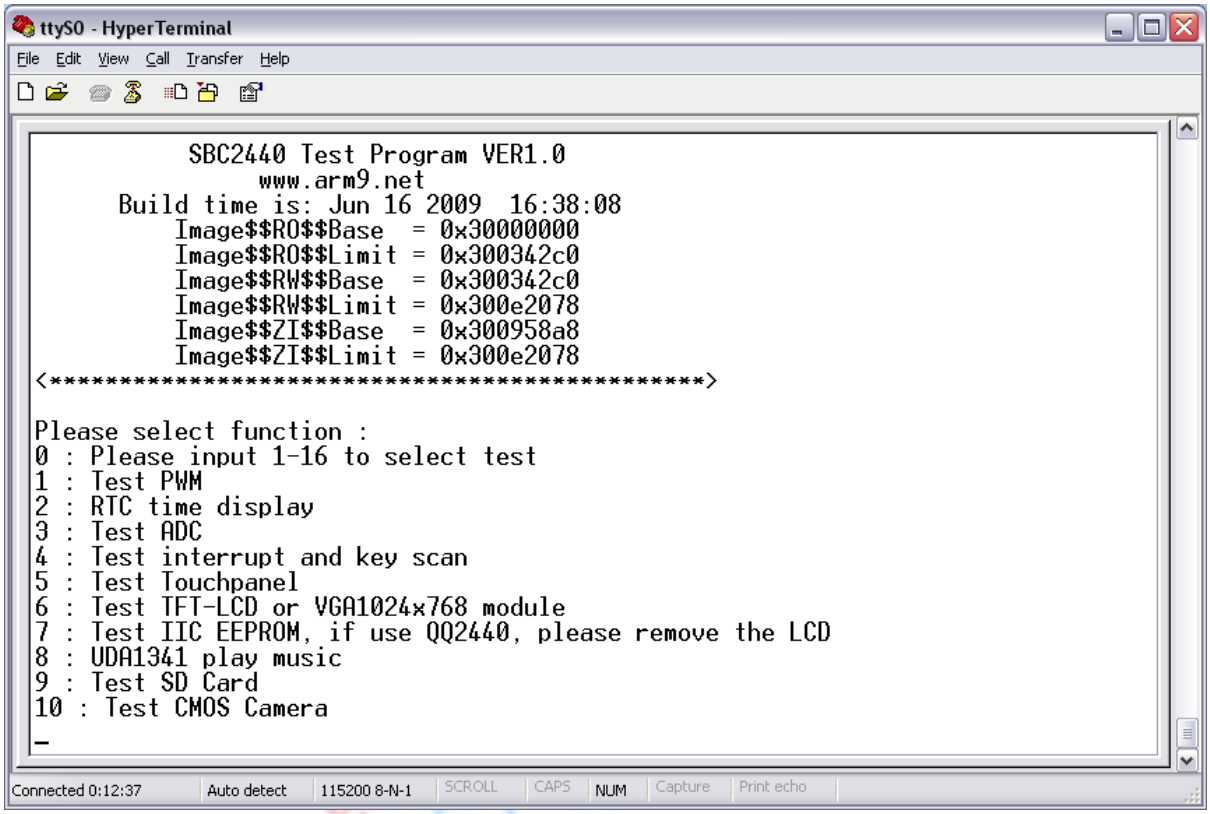
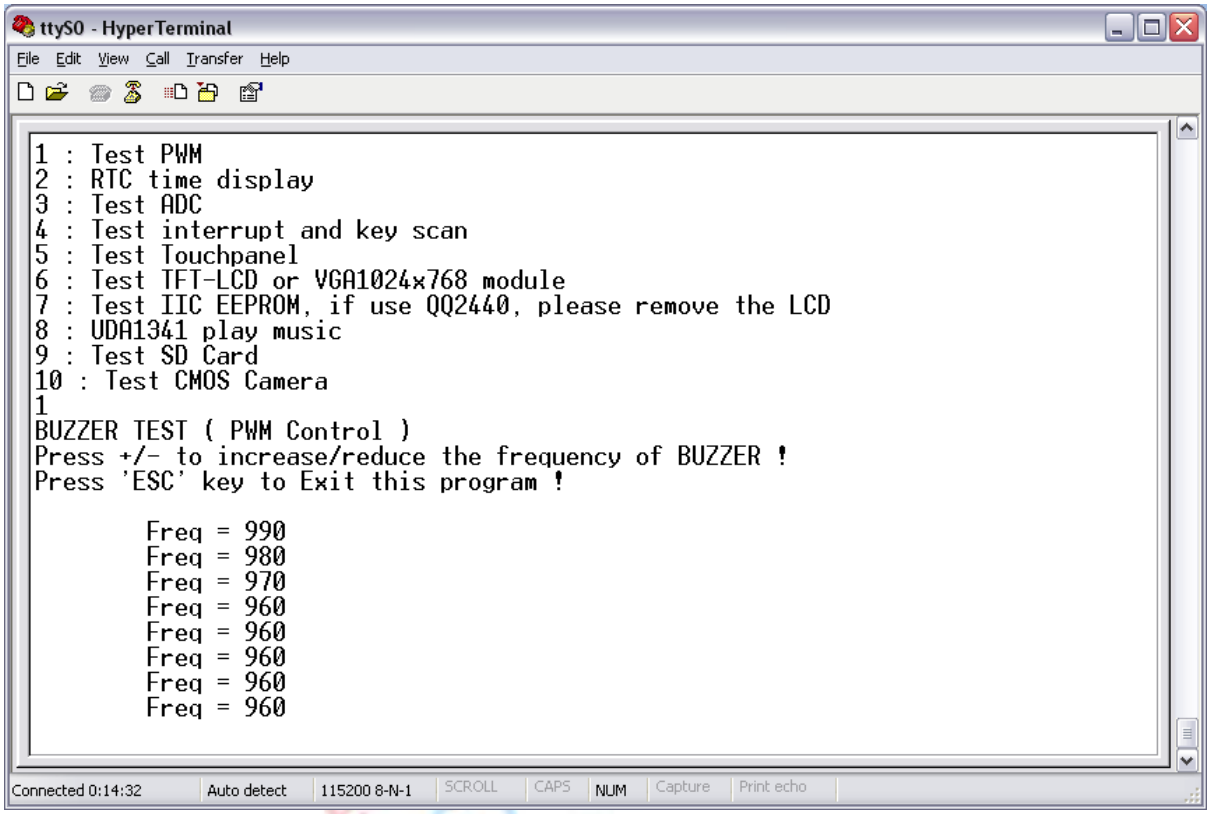
2.3.2 Test the External Resources

Test program is running, you can make the appropriate external resources to test, test procedure by selecting the corresponding main menu option, you can run the test.


ttyS0 - HyperTerminal
File Edit View Call Transfer Help
SBC2440 Test Program VER1.0
www.arm9.net
Build time is: Jun 16 2009 16:38:08
Image$$RO$$Base = 0x30000000
Image$$RO$$Limit = 0x300342c0
Image$$RW$$Base = 0x300342c0
Image$$RW$$Limit = 0x300e2078
Image$$ZI$$Base = 0x300958a8
Image$$ZI$$Limit = 0x300e2078
<**********>
Please select function :
0 : Please input 1-16 to select test
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test TFT-LCD or VGA1024x768 module
7 : Test IIC EEPROM, if use QQ2440, please remove the LCD
8 : UDA1341 play music
9 : Test SD Card
10 : Test CMOS Camera
Connected 0:12:37 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo

(1) Buzzer Test (PWM Test)

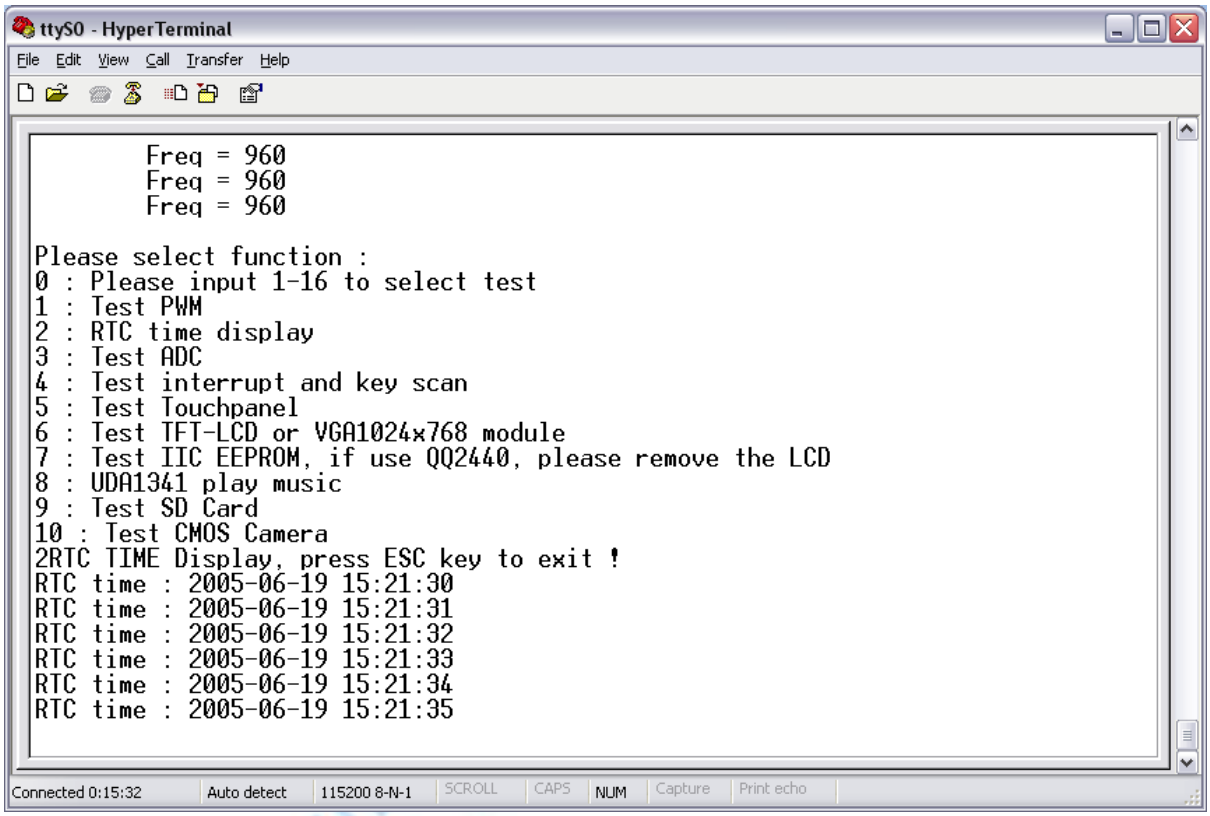
In the main menu, select "1", and then "Enter" key (or Return), will begin testing buzzer, ming buzzer test startup and running, you will hear the buzzer sound.


ttyS0 - HyperTerminal
File Edit View Call Transfer Help
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test TFT-LCD or VGA1024x768 module
7 : Test IIC EEPROM, if use QQ2440, please remove the LCD
8 : UDA1341 play music
9 : Test SD Card
10 : Test CMOS Camera
1
BUZZER TEST (PWM Control)
Press +/- to increase/reduce the frequency of BUZZER !
Press 'ESC' key to Exit this program !
Freq = 990
Freq = 980
Freq = 970
Freq = 960
Freq = 960
Freq = 960
Freq = 960
Freq = 960
Connected 0:14:32
Auto detect
115200 8-N-1
SCROLL
CAPS
NUM
Capture
Print echo

By "-" key, buzzer frequency will be reduced by "+" key to increase the frequency, according to "ESC" key to abort the test, and return to the main menu.

(2) Real-Time Clock Test

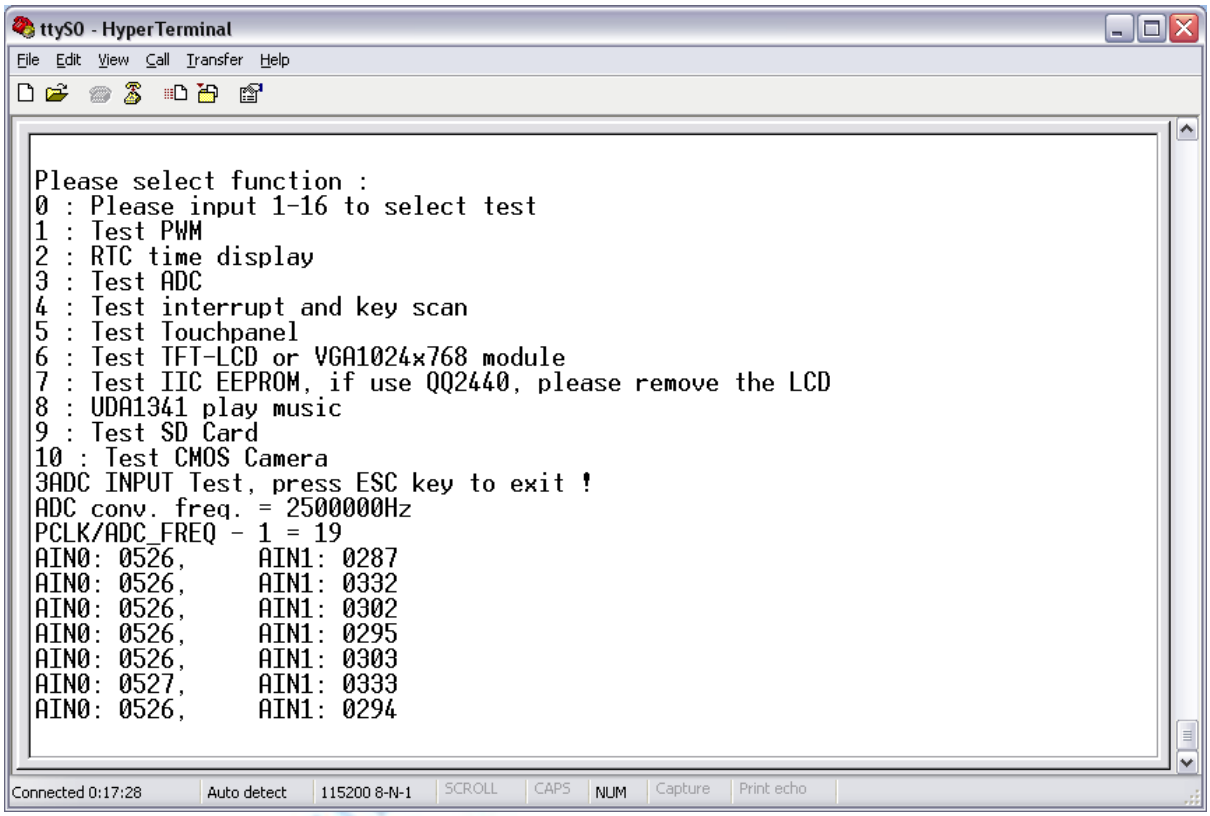
Test procedure in the main menu, select "2", and then "Enter" key, it can be seen in the constant changes in a matter of seconds, this description of the RTC in the normal CPU work (Note: the time may not be the current time, because of its initialization test procedure and the assignment)


ttyS0 - HyperTerminal
File Edit View Call Transfer Help
Freq = 960
Freq = 960
Freq = 960
Please select function :
0 : Please input 1-16 to select test
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test TFT-LCD or VGA1024x768 module
7 : Test IIC EEPROM, if use QQ2440, please remove the LCD
8 : UDA1341 play music
9 : Test SD Card
10 : Test CMOS Camera
2RTC TIME Display, press ESC key to exit !
RTC time : 2005-06-19 15:21:30
RTC time : 2005-06-19 15:21:31
RTC time : 2005-06-19 15:21:32
RTC time : 2005-06-19 15:21:33
RTC time : 2005-06-19 15:21:34
RTC time : 2005-06-19 15:21:35
Connected 0:15:32
Auto detect
115200 8-N-1
SCROLL
CAPS
NUM
Capture
Print echo

Press "ESC" key to exit the test and return to the main menu.

(3) AD Test

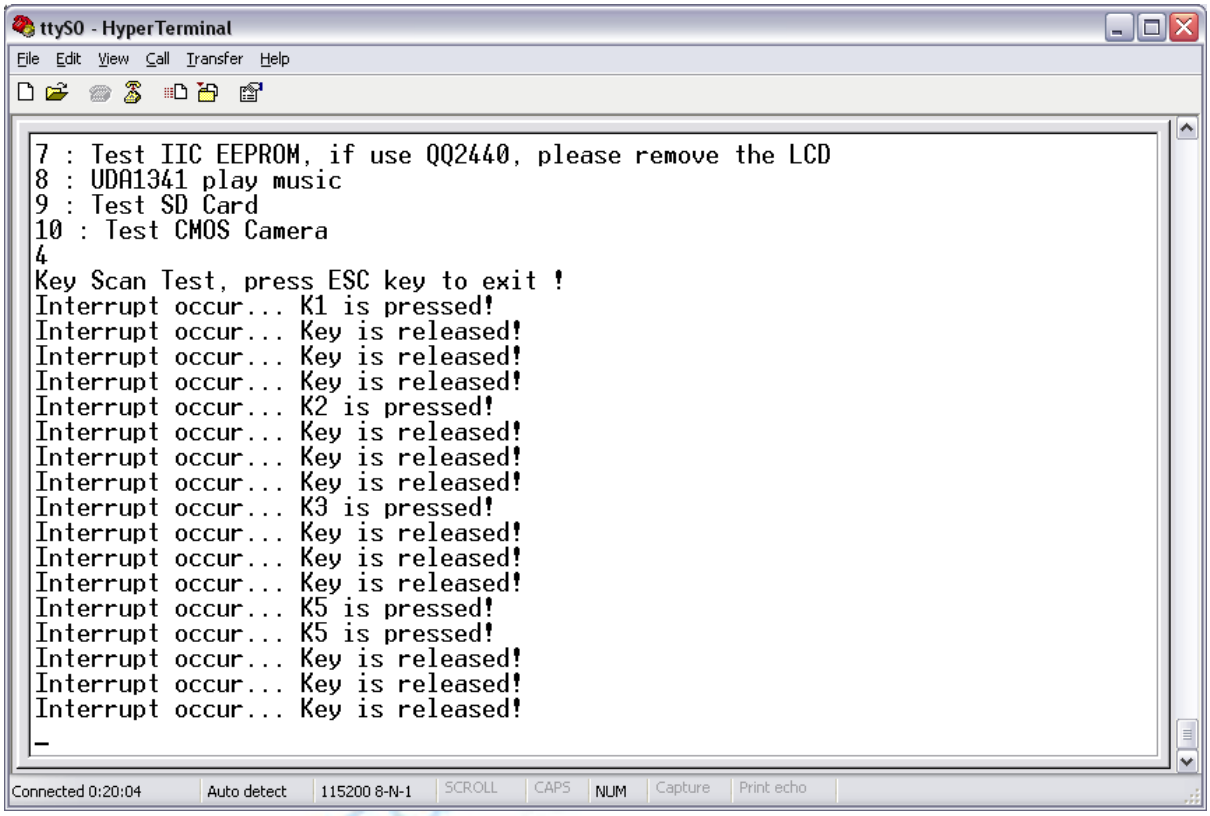
In the main menu, select "3", then "Enter" key to begin testing the implementation of AD. Users can use the screwdriver on the board regulating the development of the W1 or W2 (two adjustable resistors and then the AIN0 AIN1), the value of AD can be seen to follow the regulation of voltage in the constant changes.


ttyS0 - HyperTerminal
File Edit View Call Transfer Help
Please select function :
0 : Please input 1-16 to select test
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test TFT-LCD or VGA1024x768 module
7 : Test IIC EEPROM, if use QQ2440, please remove the LCD
8 : UDA1341 play music
9 : Test SD Card
10 : Test CMOS Camera
3ADC INPUT Test, press ESC key to exit !
ADC conv. freq. = 2500000Hz
PCLK/ADC_FREQ - 1 = 19
AIN0: 0526, AIN1: 0287
AIN0: 0526, AIN1: 0332
AIN0: 0526, AIN1: 0302
AIN0: 0526, AIN1: 0295
AIN0: 0526, AIN1: 0303
AIN0: 0527, AIN1: 0333
AIN0: 0526, AIN1: 0294
Connected 0:17:28 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo

Press "ESC" key to exit the test and return to the main menu.

(4) Key Test

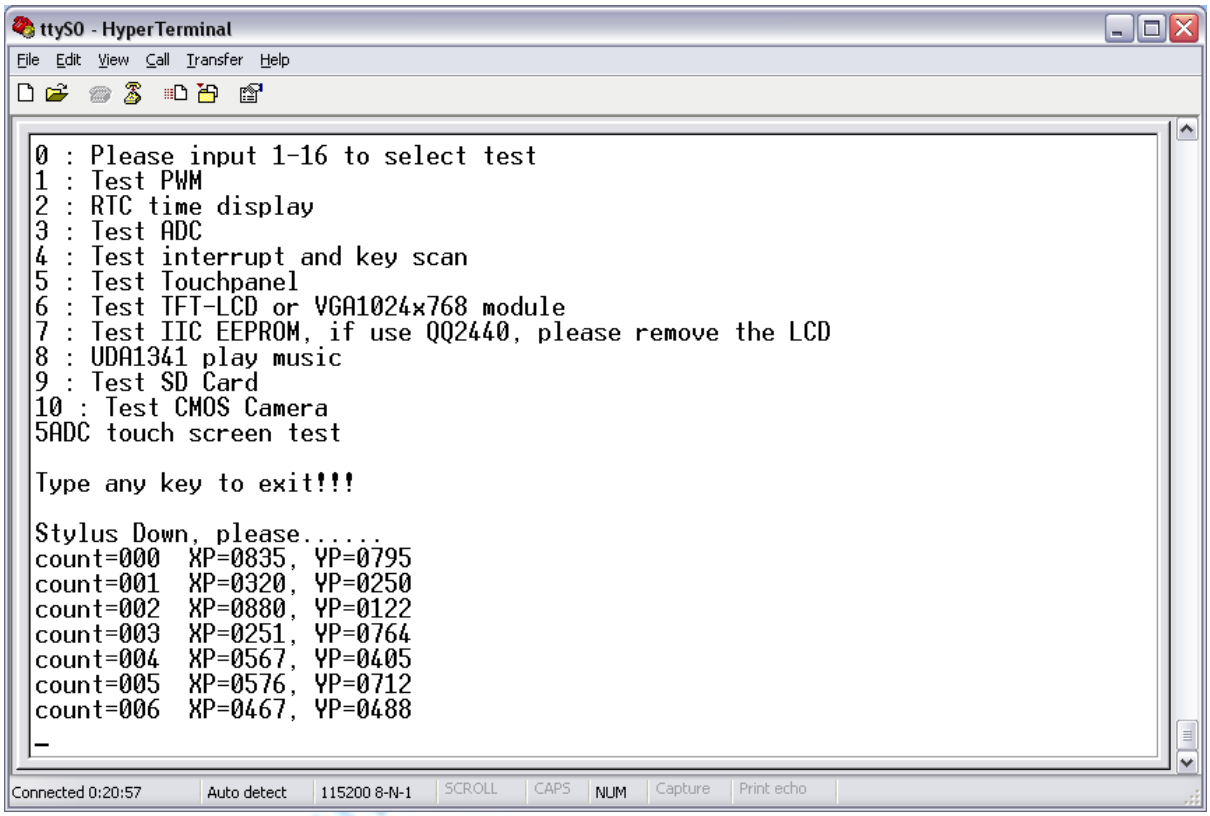
In the main menu, type "4", and then "Enter" key to start the implementation of key tests, this time on the board in accordance with the development of the K1-K6 test button, you can see the corresponding serial port print key information to terminal.


ttyS0 - HyperTerminal
File Edit View Call Transfer Help
7 : Test IIC EEPROM, if use QQ2440, please remove the LCD
8 : UDA1341 play music
9 : Test SD Card
10 : Test CMOS Camera
4
Key Scan Test, press ESC key to exit !
Interrupt occur... K1 is pressed!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... K2 is pressed!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... K3 is pressed!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... K5 is pressed!
Interrupt occur... K5 is pressed!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Interrupt occur... Key is released!
Connected 0:20:04 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo

Press "ESC" key to exit the test and return to the main menu.

(5) Touchscreen Test

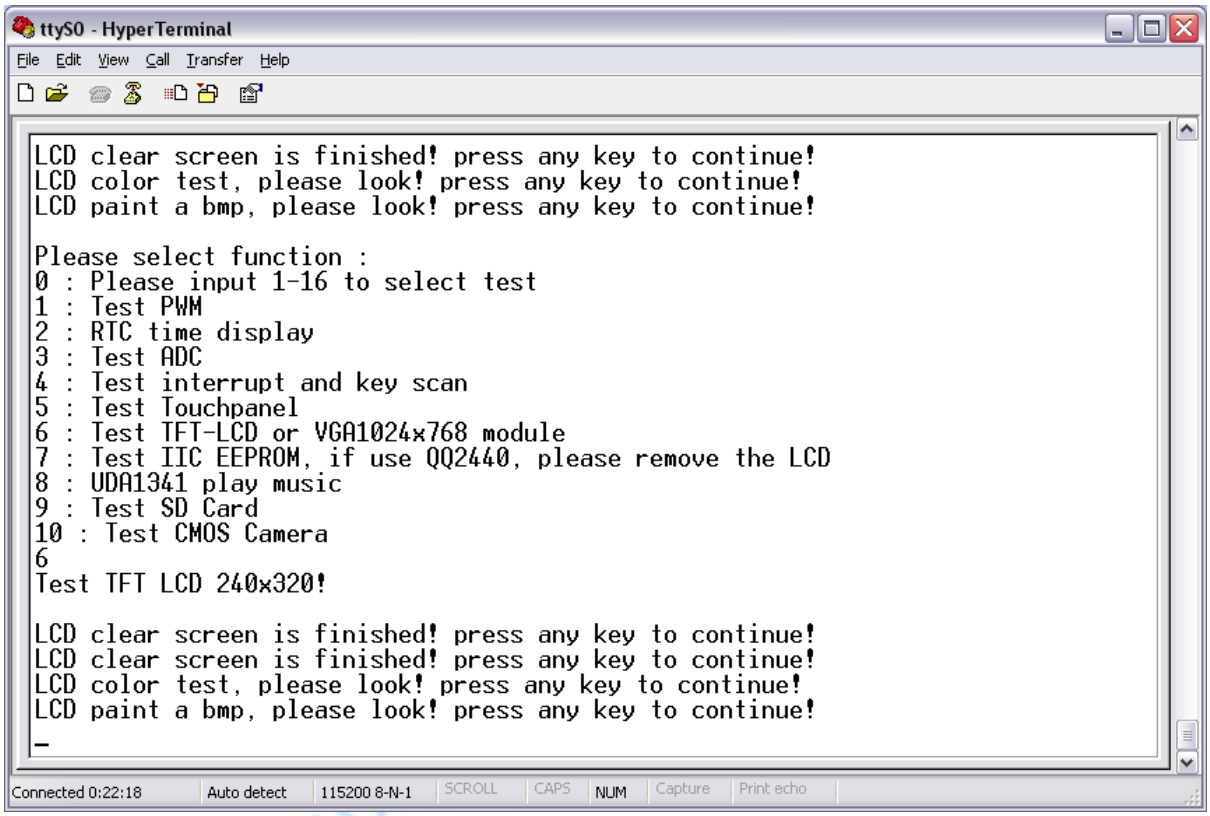
If you buy the LCD screen, use the cables attached to the development of the LCD panel interface. In the main menu Enter "5", press the "Enter" to start touch-screen test, this time with attached touchscreen stylus click, you can see information string coordinates of touch position on screen.



Press "ESC" key to exit the test and return to the main menu.

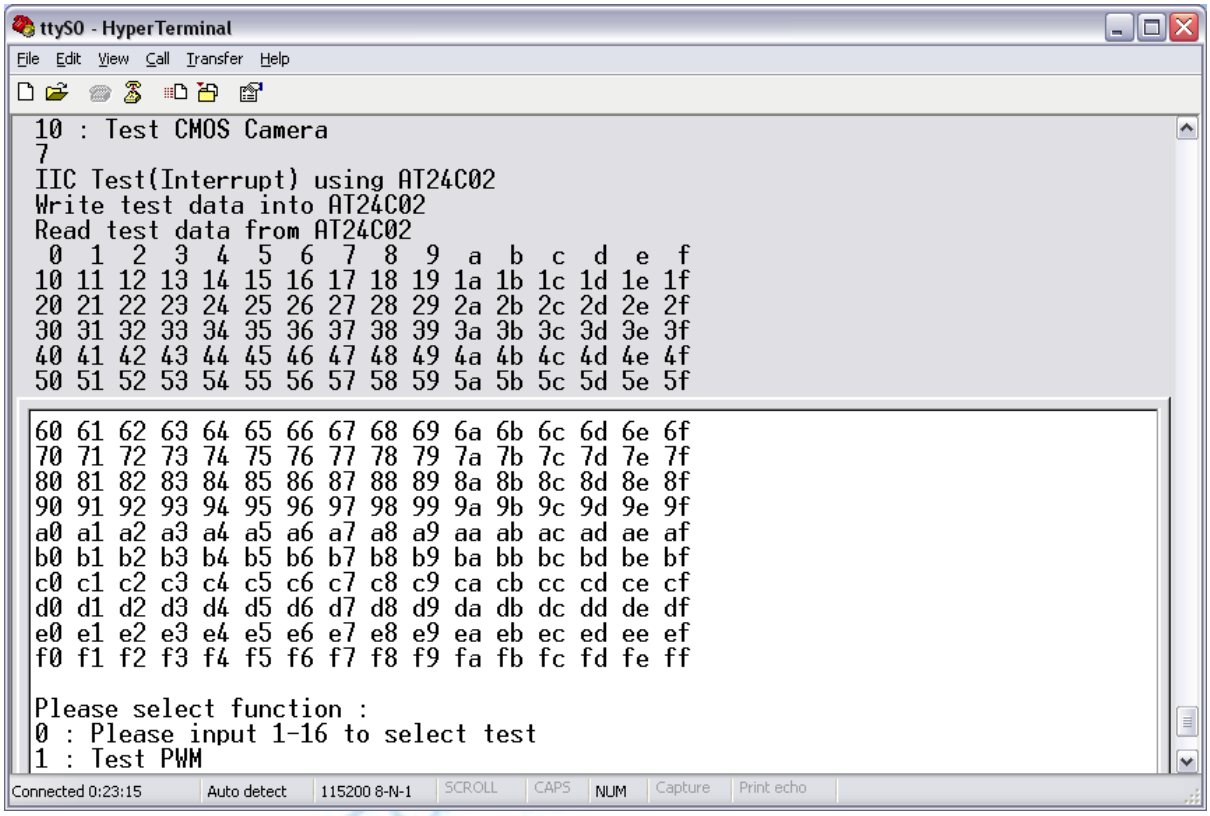
(6) LCD or VGA Output Module Test

Please program 2440test corresponding test procedures. In the main menu, enter "6" and then "Enter" key to start the implementation of testing, then follow the prompt by pressing any key, LCD will display the changing, until the end of the last shows a picture and return to the main menu.


ttyS0 - HyperTerminal
File Edit View Call Transfer Help
LCD clear screen is finished! press any key to continue!
LCD color test, please look! press any key to continue!
LCD paint a bmp, please look! press any key to continue!
Please select function :
0 : Please input 1-16 to select test
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test TFT-LCD or VGA1024x768 module
7 : Test IIC EEPROM, if use QQ2440, please remove the LCD
8 : UDA1341 play music
9 : Test SD Card
10 : Test CMOS Camera
6
Test TFT LCD 240x320!
LCD clear screen is finished! press any key to continue!
LCD clear screen is finished! press any key to continue!
LCD color test, please look! press any key to continue!
LCD paint a bmp, please look! press any key to continue!
Connected 0:22:18
Auto detect
115200 8-N-1
SCROLL
CAPS
NUM
Capture
Print echo

(7) I2C Test

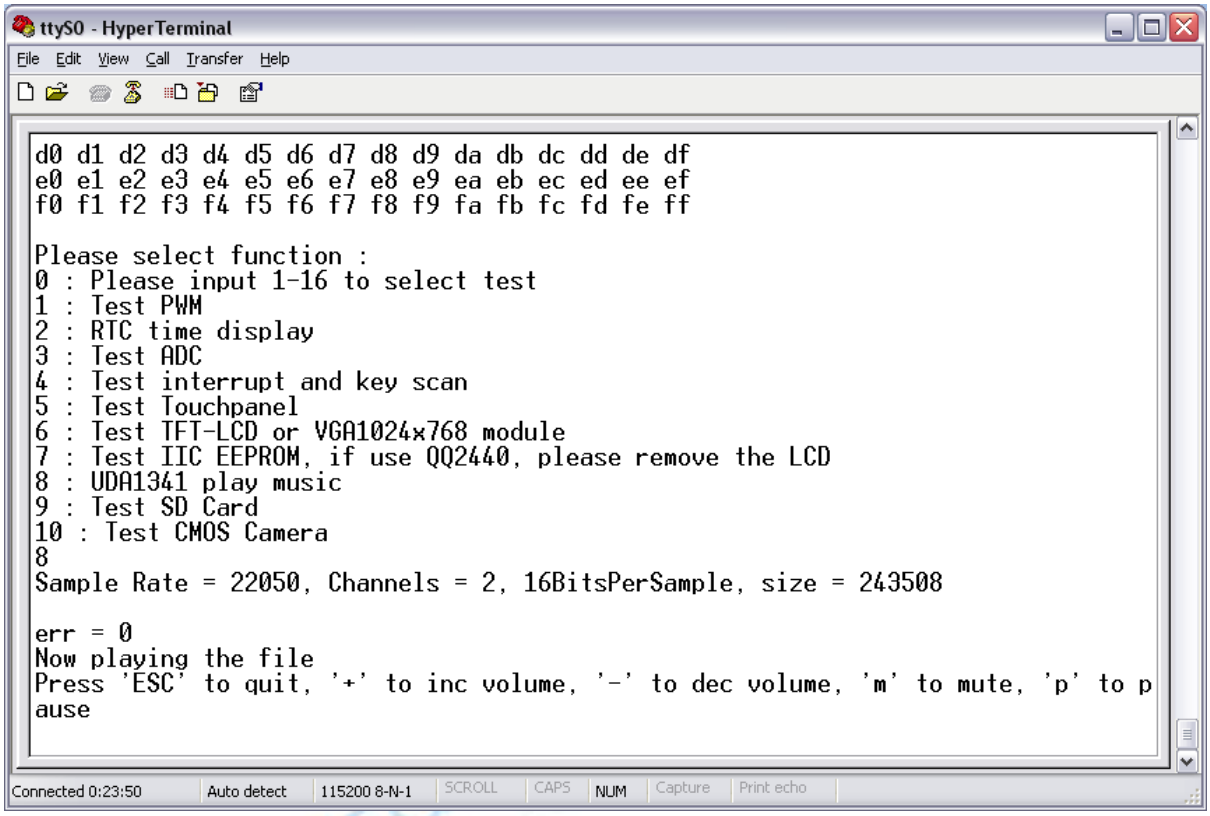
In the main menu, type "7", press the "Enter" key to start the implementation of testing procedures of AT24C08 chip I2C Bus read and write, the test is mainly to write the AT24C08 at 0x-0xFF, and then read out.


ttyS0 - HyperTerminal
File Edit View Call Transfer Help
10 : Test CMOS Camera
7
IIC Test(Interrupt) using AT24C02
Write test data into AT24C02
Read test data from AT24C02
0 1 2 3 4 5 6 7 8 9 a b c d e f
10 11 12 13 14 15 16 17 18 19 1a 1b 1c 1d 1e 1f
20 21 22 23 24 25 26 27 28 29 2a 2b 2c 2d 2e 2f
30 31 32 33 34 35 36 37 38 39 3a 3b 3c 3d 3e 3f
40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f
50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f
60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f
70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f
80 81 82 83 84 85 86 87 88 89 8a 8b 8c 8d 8e 8f
90 91 92 93 94 95 96 97 98 99 9a 9b 9c 9d 9e 9f
a0 a1 a2 a3 a4 a5 a6 a7 a8 a9 aa ab ac ad ae af
b0 b1 b2 b3 b4 b5 b6 b7 b8 b9 ba bb bc bd be bf
c0 c1 c2 c3 c4 c5 c6 c7 c8 c9 ca cb cc cd ce cf
d0 d1 d2 d3 d4 d5 d6 d7 d8 d9 da db dc dd de df
e0 e1 e2 e3 e4 e5 e6 e7 e8 e9 ea eb ec ed ee ef
f0 f1 f2 f3 f4 f5 f6 f7 f8 f9 fa fb fc fd fe ff
Please select function :
0 : Please input 1-16 to select test
1 : Test PWM
Connected 0:23:15
Auto detect
115200 8-N-1
SCROLL
CAPS
NUM
Capture
Print echo

After the test end, it will automatically return to the main menu.

(8) Audio Output Test

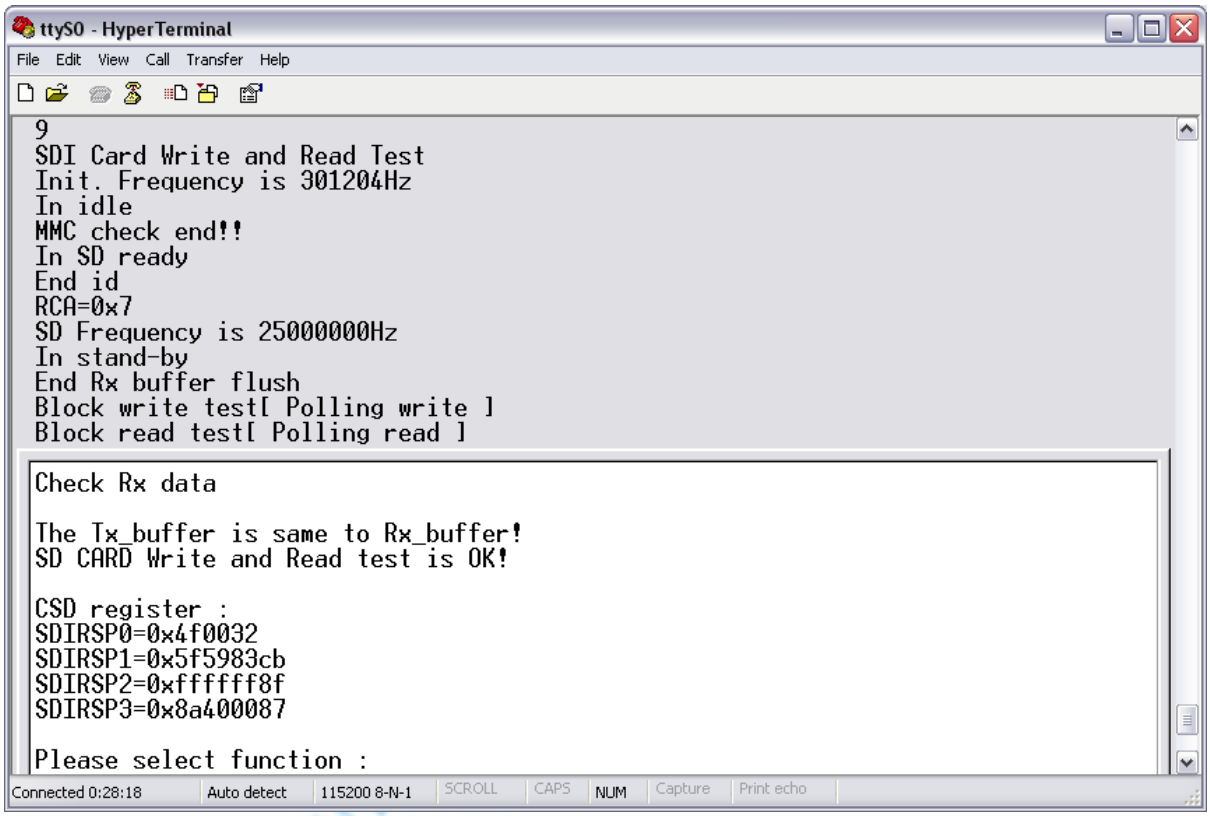
Plug the speaker or headphone into the hole at the green block of development board first. In the main menu, type "8", press the "Enter" to start the audio transmission test, this time to hear XP startup sound from the speaker.


ttyS0 - HyperTerminal
File Edit View Call Transfer Help
d0 d1 d2 d3 d4 d5 d6 d7 d8 d9 da db dc dd de df
e0 e1 e2 e3 e4 e5 e6 e7 e8 e9 ea eb ec ed ee ef
f0 f1 f2 f3 f4 f5 f6 f7 f8 f9 fa fb fc fd fe ff
Please select function :
0 : Please input 1-16 to select test
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test TFT-LCD or VGA1024x768 module
7 : Test IIC EEPROM, if use QQ2440, please remove the LCD
8 : UDA1341 play music
9 : Test SD Card
10 : Test CMOS Camera
8
Sample Rate = 22050, Channels = 2, 16BitsPerSample, size = 243508
err = 0
Now playing the file
Press 'ESC' to quit, '+' to inc volume, '-' to dec volume, 'm' to mute, 'p' to p
ause
Connected 0:23:50
Auto detect
115200 8-N-1
SCROLL
CAPS
NUM
Capture
Print echo

By "+" or "-" can increase or decrease the volume, press "ESC" key from the test, return to the main menu.

(9) SD Card Test

Note: This test will destroy the data in the SD Card; try to back up the data in the SD Card. Insert SD Card to development board SD Card Socket first. In the main menu, type "9", press the "Enter" to start the implementation of testing procedures for the SD Card read, and an interface shown as follows.

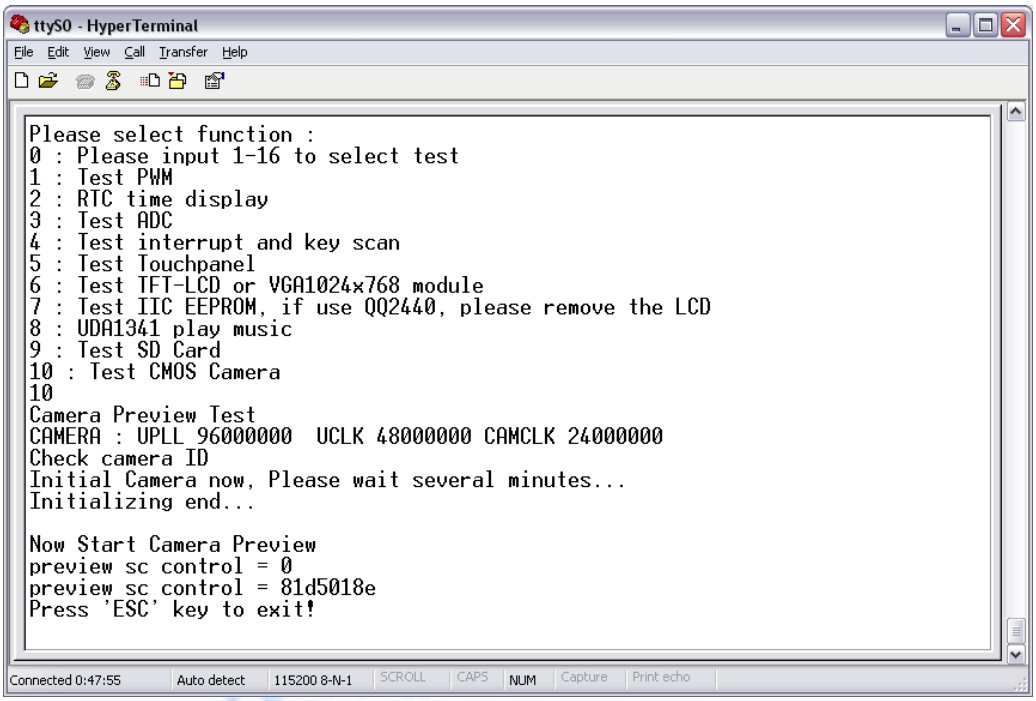


The interface shows the success of SD Card read, after tests completed, it will automatically back to the main menu.

(11) Testing CMOS Camera

If you choose the company's provided CMOS Camera models CAM130, can be the functional tests. Put the CAM130 Camera module in accordance with the direction of the arrow on development board into "CAMERA" row seat, in the main menu, type "10", and press the "Enter" to start the implementation of testing,

Note: If you are using 7" screen or VGA output module, LCD display interface will be different.


ttyS0 - HyperTerminal
File Edit View Call Transfer Help
Please select function :
0 : Please input 1-16 to select test
1 : Test PWM
2 : RTC time display
3 : Test ADC
4 : Test interrupt and key scan
5 : Test Touchpanel
6 : Test TFT-LCD or VGA1024x768 module
7 : Test IIC EEPROM, if use QQ2440, please remove the LCD
8 : UDA1341 play music
9 : Test SD Card
10 : Test CMOS Camera
10
Camera Preview Test
CAMERA : UPLL 96000000 UCLK 48000000 CAMCLK 24000000
Check camera ID
Initial Camera now, Please wait several minutes...
Initializing end...
Now Start Camera Preview
preview sc control = 0
preview sc control = 81d5018e
Press 'ESC' key to exit!
Connected 0:47:55
Auto detect
115200 8-N-1
SCROLL
CAPS
NUM
Capture
Print echo

The use of NEC 3.5" screen, CMOS camera effects: